What is Claimed is:

Claim 1. A bulk acoustic wave resonator, comprising

a first piezoelectric layer made of a material oriented toward a first direction; and a second piezoelectric layer made of a material oriented toward a second direction opposed to the first direction; the first piezoelectric layer and the second piezoelectric layer being acoustically coupled with each other;

a first electrode, on which the first piezoelectric layer is at least partially formed;

a second electrode formed at least partially on the first piezoelectric layer, the second piezoelectric layer being at least partially arranged on a first portion of the second electrode;

an additional first piezoelectric layer arranged at least partially on a second portion of the second electrode, the second piezoelectric layer and the additional first piezoelectric layer being arranged so as to be spaced apart from each other;

a third electrode arranged at least partially on the second piezoelectric layer; and

a fourth electrode arranged at least partially on the additional first piezoelectric layer.

Claim 2. The bulk acoustic wave resonator as claimed in claim 1, comprising

a substrate; and

an acoustic reflector having the piezoelectric layers arranged thereon so that the piezoelectric layers are acoustically separated from the substrate.

Claim 3. The bulk acoustic wave resonator as claimed in claim 1, comprising

a substrate having a diaphragm area, the piezoelectric layers being arranged on the diaphragm area so that they are acoustically separated from the substrate.

Claim 4. The bulk acoustic wave resonator as claimed in claim 2, comprising an additional acoustic reflector arranged on the piezoelectric layers.

Claim 5. The bulk acoustic wave resonator as claimed in claim 1, wherein the first electrode is an input electrode, the second electrode is a mass electrode, and the third and fourth electrodes are first and second output electrodes.

Claim 6. The bulk acoustic wave resonator as claimed in claim 1, wherein the first electrode is an output electrode, second electrode is a mass electrode, and the third and fourth electrodes are first and second input electrodes.

Claim 7. The bulk acoustic wave resonator as claimed in claim 1, wherein the orientation of the first and/or the second piezoelectric layer is specified by setting the growth conditions during the production of the first and/or the second piezoelectric layer.

Claim 8. The bulk acoustic wave resonator as claimed in claim 1, wherein the first and/or second piezoelectric layer consists of a ferroelectric material, the orientation of the first and/or second piezoelectric layer being specified, after producing the piezoelectric layers, by applying a suitable electrical field.

Claim 9. A bulk acoustic wave filter comprising at least one bulk acoustic wave resonator, the at least one bulk acoustic wave resonator comprising

a first piezoelectric layer made of a material oriented toward a first direction; and a second piezoelectric layer made of a material oriented toward a second direction opposed to the first direction; the first piezoelectric layer and the second piezoelectric layer being acoustically coupled with each other;

a first electrode, on which the first piezoelectric layer is at least partially formed;

a second electrode formed at least partially on the first piezoelectric layer, the second piezoelectric layer being at least partially arranged on a first portion of the second electrode;

an additional first piezoelectric layer arranged at least partially on a second portion of the second electrode, the second piezoelectric layer and the additional first piezoelectric layer being arranged so as to be spaced apart from each other;

a third electrode arranged at least partially on the second piezoelectric layer; and

a fourth electrode arranged at least partially on the additional first piezoelectric layer.

Claim 10. The bulk acoustic wave filter of claim 9, wherein the first and/or second piezoelectric layer consists of a ferroelectric material, the orientation of the first and/or second piezoelectric layer being specified, after producing the first and/or second piezoelectric layer, by applying a suitable electrical field.

Claim 11. A method of manufacturing a bulk acoustic wave resonator comprising the steps of:

forming a first piezoelectric layer having a first polarization;

forming a second piezoelectric layer having a second polarization at a distance above the first piezoelectric layer, the second polarization opposite the first polarization; and

forming above the first piezoelectric layer a third piezoelectric layer having the first polarization, the third piezoelectric layer at the same distance above the first piezoelectric layer as the second piezoelectric layer and spaced apart from the second piezoelectric layer.

Claim 12. The method of claim 11, further comprising, before the step of forming a first piezoelectric layer, the step of,

forming a first electrode, and wherein the step of forming a first piezoelectric layer comprises the step of

forming the first piezoelectric layer at least partially above the first electrode.

Claim 13. The method of claim 12, further comprising, before the step of forming a second piezoelectric layer, the step of,

forming a second electrode at least partially above the first piezoelectric layer and wherein the step of forming a second piezoelectric layer comprises the step of

forming the second piezoelectric layer at least partially above the second electrode.

Claim 14. The method of claim 13, wherein the step of forming a second electrode is performed prior to the step of forming a third piezoelectric layer.

Claim 15. The method of claim 13, wherein:

the step of forming a first piezoelectric layer comprises the steps of,

forming a first piezoelectric layer with a ferroelectric material, and

applying an electric field to the ferroelectric material of the first piezoelectric layer to obtain the first polarization;

the step of forming a second piezoelectric layer comprises the steps of,

forming a second piezoelectric layer with a ferroelectric material, and

applying an electric field to the ferroelectric material of the second piezoelectric layer to obtain the second polarization; and

the step of forming a third piezoelectric layer comprises the steps of,

forming a third piezoelectric layer with a ferroelectric material, and

applying an electric field to the ferroelectric material of the third piezoelectric layer to obtain the first polarization.

Claim 16. The method of claim 15, wherein the step of applying an electric field to the ferroelectric material of the third piezoelectric layer is performed prior to the step of applying an electric field to the ferroelectric material of the second piezoelectric layer.

Claim 17. The method of claim 15, wherein the step of applying an electric field to the ferroelectric material of the first piezoelectric layer is performed in conjunction with the step of applying an electric field to the ferroelectric material of the third piezoelectric layer.

Claim 18. The method of claim 13, further comprising the step of:

providing a substrate having a diaphragm, and wherein the step of forming a first piezoelectric layer comprises the step of:

forming a first piezoelectric layer above the diaphragm of the substrate.

Claim 19. The method of claim 13, further comprising the step of:

providing an acoustic reflector, and wherein the step of forming a first piezoelectric layer comprises the step of:

forming a first piezoelectric layer above the acoustic reflector.

Claim 20. The method of claim 13, further comprising the steps of:

forming a third electrode at least partially above the second piezoelectric layer; and

forming a fourth electrode at least partially above the third piezoelectric layer.